

## **Hydraulic Evaluation of Reclamation Fish Release Sites**

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### **Summary**

For several years there has been considerable focus and discussion on the performance of fish release sites used by U.S. Department of Interior, Bureau of Reclamation (Reclamation) and California Department of Water Resources (DWR). Reclamation and DWR each maintain and operate two or three separate fish release sites at different locations on the Sacramento River. Fish release sites are essential to the fish salvage process at the Tracy Fish Collection Facility (TFCF) because they allow salvaged fish to be re-introduced to native waters. The state and federal release sites are similar in concept, yet all release sites are unique and possess different operating conditions. Fish survival during and following the release process has been the topic of several biological studies. Fish survival is dependent on both biological and hydraulic parameters associated with the release process. In 2008 DWR conducted a biological and hydraulic assessment of the California state water project fish release sites (Miranda and Padilla 2010). The DWR study evaluated fish survival and hydraulic performance of a DWR release site using a physical hydraulic model and a three-dimensional computational fluid dynamics (CFD) model of the release sites. The study identified several hydraulic issues associated with design and operation of state water project release sites that resulted in improvement actions. While considerable attention has been given to DWR sites, Reclamation's sites have not been evaluated. This proposal addresses the need to conduct hydraulic evaluations of Reclamation's fish release sites. Although Reclamations sites are similar to the DWR, the site geometry, supplemental water supply, and haul trucks are different than DWRs which requires similar evaluations to take place.

### **Problem Statement**

In FY11 a project was funded to evaluate Reclamation's fish salvage release sites. At the time the proposal was written it was assumed that the depths, slopes, and lengths of the fish release sites were known. Unfortunately design drawings and specifications

provided little insight to actual site geometries. As a result, additional funding is necessary to collect as-built geometries for the TFCF release sites. The Technical Service Center (TSC; Denver, Colorado) recently acquired a Kongsberg Mesotech MS 1000 sonar profiler which has the capability of mapping and locating underwater surfaces and objects. It is believed that this instrument can be used to measure existing site geometry and create the necessary as-built drawings of the release sites, specifically the submerged portion of the discharge pipe. Recently both TFCF release sites have been unusable due to malfunctioning equipment. In one instance woody debris plugged the release pipe which prevented fish salvage for a period of time. Completing this study will provide the information necessary to improve the existing release sites.

## Goals and Hypotheses

### *Goal:*

1. Determine as-built geometries of both TFCF release sites that can be used to develop a Flow3D model of the release sites. The Flow3D model will allow hydraulic evaluations of the release sites to continue.

### *Hypothesis:*

1. Using the new sonar technology that is readily available to Reclamation is faster, simpler, and less expensive than other methods of creating the necessary as-built geometries.

## Materials and Methods

A Kongsberg Mesotech MS 1000 sonar profiler will be used to collect the as-built dimensions of the release site pipes. This instrument can be deployed to monitor and measure distances and dimensions of objects while they are submerged in water. As such, determining slopes and release pipe dimensions will not require the use of a dive team. The sonar instrument will be deployed from a small boat. Measurements will be made available real time as the release sites are scanned. In addition, monitoring of vegetative growth around the pump inlets may also be possible using the MS 1000.

## Coordination and Collaboration

The study will be coordinated between the TSC, Mid-Pacific Region, and TFCF staffs and the interagency Tracy Technical Advisory Team through regular updates and meetings.

## Endangered Species Issues

This study will not require permitting.

## Dissemination of Results (Deliverables and Outcomes)

This study will enable TSC researchers to complete a currently funded project evaluating the fish release sites. Deliverables from this project will be reported under that study.